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(54) Title: A METHOD AND APPARATUS FOR PROVIDING SIGNAL ANALYSIS OF A BIONEMS RESONATOR OR TRANSDUCER

(57) Abstract: An outputs signal,  $v(t)$ , is generated from a bioNEMs transducer and mixed with a reference signal and then filtered to generate a correlator output,  $r(t)$ . The correlator output is detected to generate a signal  $u(t)$  and then determined whether the signal  $u(t)$  satisfies a predetermined threshold. If qualified, it is then decided whether the signal  $u(t)$  represents a predetermined type of interaction between a free ligand in a fluid in which the NEMS device is immersed and a receptor attached to the transducer. The threshold is the Neyman-Pearson criterion based on a predetermined probability of false detection,  $P_{fa}$ . The interaction may be binding of a free ligand to the receptor or releasing a bound ligand from the receptor by competitive binding with the free ligand. The step of detecting comprises detecting the envelope of the signal,  $r(t)$ .

WO 03/095617 A2